SECTION 15950 - CONTROLS

PART 1 – GENERAL

1.1 SCOPE OF SECTION:

Items for operating and controlling heating, ventilating, and air conditioning systems and equipment. Includes piping, tubing, wiring, control panels, thermostats, humidistats, aquastats, timers, recording and alarm devices, energy management system, and sequences of operations related to HVAC equipment.

1.2 BUILDING SYSTEMS CONTROL:

A. HVAC CONTROLS:

1. General: Temperature control zones shall not combine areas with very different heating and/or cooling loads.

2. Ductwork Accessories: Damper systems designed to modulate shall be designed for easy inspection and maintenance.

3. Air Handling Equipment: If return & supply air fans are utilized, controls shall be provided which will insure their coordination and eliminate the possibility of over or under pressurization of the mixing plenum.

4. Thermostats and Sensors:

a) Wall-mounted thermostats shall not be used in places where they are accessible to the general public e.g. classrooms, corridors, and libraries, as they are subject to damage and mis-adjustment in these locations. Instead, specify return-air sensors. The location of these sensors shall be noted on the plans and as-built drawings. All thermostats/sensors shall be marked with associated VAV box and room assignments. The Building Automation Database shall include information; available to the user that describes thermostat/sensors terminal unit assignment and all associated spaces.

b) If required, in administrative, laboratory and private offices, thermostats shall include local adjustment and shall include a warmer cooler slider that can be adjusted for minimum and maximum CLG/HTG set-point range. Minimum and maximum range shall be adjusted through the building automation system only.

c) Thermostats/sensors shall not be located where they are subject to drafts, direct sunlight, or heat from nearby equipment.

d) A zone assigned temporary override push-button/timer shall be installed for each system and/or zone. An 81/2 X 11 inch framed and laminated map shall be located adjacent to zone override devices indicating zone served.

e) Thermostats shall be capable of dual set point settings, whether internally or as a function of the Building Control System (BAS). This shall consist of a heating set point, a cooling set point and a dead band between the two. Thermostats will have security measures that prevent occupants from tampering with settings, either as an internal function of the device or through the BAS.

5. Time Clocks: Time clocks are typically not an acceptable control for HVAC applications.

6. Enclosures for Building Systems Control Electronics: Provide NEMA 4 metal enclosure of an appropriate size and install the electronics inside the enclosure. Simple "coin turn" latch or other mechanical latch is sufficient (lock is not required).

1.3 ENERGY MANAGEMENT AND CONSERVATION SYSTEMS (EMCS):

A. DIRECT DIGITAL CONTROLS (DDC):

1. EMCS/DDC controls shall be functionally comparable to the University of Florida Johnson Controls Metasys network. The EMCS shall be able to communicate and be programmed over a common WEB Based server platform utilizing the University of Florida Ethernet backbone. All functions of a standard facility management workstation shall be implemented at the Client PC Work Stations located anywhere within the University WAN. The Client PC shall not require any special software to access building automation systems.

2. Acceptable manufacturers: shall be Johnson Controls, Automated Logic, or Siemens. No others are acceptable.

3. EMCS shall be field-programmable microprocessor-based, stand-alone EMCS/DDC panels installed in a conditioned space (exceptions will be looked at on a case-by-case basis, with written approval required from Assistant Director, with the capability to upgrade through modules. Programming shall utilize low-level English language. Outdoor installations of EMCS/DDC panels are not permitted.

4. EMCS/DDC panels shall include but not be limited to Diagnostic Functions, Serviceability Functions, Control Functions, Management Functions, Time of Day Programming, Demand Control, Automatic Restart Programming, and Alarms.

5. Controls: EMCS shall utilize Direct Digital Controls with pneumatic actuation. Terminal boxes shall utilize electric or pneumatic actuation on all reheat control valves and electric actuation for all damper control. VAV terminal actuator shall be mounted external to the box allowing easy access to equipment.

6. Naming Convention: Refer to PPD "BAS Naming Convention" standards document for all building automation short and long naming convention. Contact PPD for the latest edition.

7. Communications:

   a) The automatic temperature control (ATC) system shall include an open-protocol communication scheme based on a server-client architecture, designed around a WEB Based system architecture. The basis of the Direct Digital Control Systems communications system shall be the latest edition of ANSI/ASHRAE Standard 135-1995 BACnet/IP protocol from the building level controller up to the WEB Based server operating system.

   b) All building level components and controllers specified shall be true "peer-to-peer" communicating devices. Components or controllers requiring "polling" by a host to pass data shall not be acceptable. Communication protocols of building level control

shall be any of the following protocols: BACnet, Johnson Controls N1/N2 protocols, or Siemens P1/P2 protocol.

c) Fiber optic cable shall be used between buildings.

d) Telephone modem communication is not acceptable, except at locations remote from campus and as approved by PPD.

8. Analog Output/Binary Output: All AO and BO output points should include a local override option consistent with the hand-off-override concept. All analog outputs shall include a potentiometer override feature that produces a proportional output signal at end device.

9. The EMCS shall include a direct connection to the building control system, independent of the UF WAN/LAN, and be furnished as part of the system.

B. CHILLED WATER METERING AND TOTALIZATION:

1. All new and renovated buildings supplied with chilled water shall be metered as outlined below.

2. Flow Measurement: Electromagnetic flow meter, full bore rated for 150 psig minimum with an accuracy of plus or minus 1% of measured flow, to include converter. See Temperature Measurement requirements for sensors (supply & return) used in tonnage calculation. Totalization of tonnage data is to be presented in Kilo Ton Hr (KTNHR). BAS shall also display chilled water flow rate, and real time tonnage values.

3. Flow meter shall be remotely read on an accessible wall within the equipment room mounted 48" a.f.f.

4. Flow Meter Sizing: Sizing of flow meters shall be based on existing load or expected load, (not line size).

5. Flow meter reading shall be in GPM.

6. 4-20 ma signal only.

7. Acceptable Flow Measurement Manufacturers: Yokogawa, Foxboro, Emco.

8. Temperature Measurement: Use high accuracy +/- .1% platinum RTD sensor for all temperature readings used in conjunction with tonnage calculations Supply and Return temperature readings shall report to the BAS as separate and independent data points. A pressure/temperature test port (Pete's Plug) shall be installed adjacent to each sensor to allow for calibration.'

9. Totalization: Where available, Campus EMCS should be used for chilled water totalization. Where campus EMCS is not available, a stand-alone non-resetable totalizing register KTNH (Kilo Ton Hour) totalizer should be used; if register is electrically driven, then a 30-day battery back up shall be provided. The Project will include the cost of programming for daily and monthly totalization when connected to campus EMCS.

C. STEAM MEASUREMENT AND TOTALIZATION:

1. All new and renovated buildings supplied with steam shall be metered as outlined below.

2. Flow Measurement: Steam meters shall be in-line type, vortex flow meter. Install meters inside building only on high-pressure (80 psig) line. Secure to prevent tampering with readings or program. Provide separate pressure/temperature reading information to EMCS where available. Steam meter shall be pressure and temperature compensated to assure accuracy when pressure and temperature fluctuate. BAS shall display steam flow rate, pressure and temperature.

3. Acceptable Manufacturers: Yokogawa, Foxboro, Emco.

4. Flow meter shall be remotely read on an accessible wall within the equipment room mounted 48" a.f.f.

5. Campus EMCS Network: Units installed in buildings that are on the Campus EMCS network shall be connected to the EMCS.

6. Flow Meter Sizing: Sizing of flow meters shall be based on existing load or expected load, (not line size).

7. Flow meter reading shall be in lb/hr.

8. 4-20 ma signal only.

9. Totalization: Where available, Campus EMCS shall be used for steam totalization and shall be programmed to read total KLB (Kilo Pounds). Where campus EMCS is not available, a stand-alone non-resetable totalizing register KLB (Kilo Pound) totalizer shall be used; if register is electrically driven, then a 30-day battery back up shall be provided. The cost of Programming for daily and monthly totalization, when connected to campus EMCS shall be included.

D. Appropriate surge protection shall be installed at all direct digital control panels (DDCP).

E. WARRANTY: The warranty period for Energy Management and Conservation Systems shall not begin until Substantial Completion and shall not be less than 2 years for parts and not less than 1 year for parts/labor.

1.4 CONTROL SYSTEMS:

A. PNEUMATIC CONTROL SYSTEMS:

1. Control Air Compressors:

a) All installations shall have a redundant source of control air to allow for maintenance and outage of either source. The sources of control air shall be completely independent back to the breaker panel.

b) Where available, campus compressed air system may be used as a primary source. Provide a shut-off valve inside and within for maintenance service.

c) The compressed air system shall be monitored by the BAS. Means of monitoring shall be via pressure switch installed at the 20 PSIG regulated side.

d) Control air compressors shall have the following features:

1) External, disposable, cartridge-type oil filter.

2) Positive pressure lubrication system.

3) Load less starting.

4) Automatic purge piped to drain.

e) Acceptable Manufacturer: Quincy.

2. Compressed Air Dryer:

a) All control air systems shall include a dryer.

b) Acceptable Manufacturer: Hankison, models 8010, 8015, 8025.

c) Dryer operational status shall be monitored by BAS.

3. Pneumatic air tubing:

a) Hard copper or polyethylene tubing is acceptable.

b) Copper tubing shall be the hard-drawn seamless type. Polyethylene tubing shall be type FR plenum rated.

c) All exposed areas: Shall be exposed hard copper or polyethylene tubing in conduit.

d) Enclosed areas (above ceiling): Shall be hard copper or polyethylene tubing. Poly tubing located above ceiling shall be bundled with plastic ties and supported as required (e.g. J-Hooks). Copper and poly tubing shall be labeled at both ends of termination.

e) Enclosed areas (behind walls above hard ceiling): When poly tubing is used, conduit shall be installed from wall box to above finished ceiling and turned out with long radius 90 degree fitting.

B. ELECTRIC CONTROL DEVICES:

1. Sensors: When electronic sensors are installed on HVAC equipment and piping; analog gauges, test well or taps shall be installed along with the sensors, for calibration and validation.

2. Duct temperature measurement shall be by averaging elements for ducts larger than 2 feet (measured at the largest dimension).

3. Low limit protection devices shall be installed on all air-handling units.

4. High pressure safety devices shall be installed on all air handling units containing any device that could potentially block air flow at the fan (e.g. discharge smoke damper).

5. Current relay technology shall be used for all equipment status indication with the exception of packaged equipment, which must be monitored at the equipment main interface panel.

1.5 HVAC SEQUENCE OF OPERATION:

A. GENERAL:

1. Control systems shall allow for unoccupied setback of both temperature and humidity i.e. HVAC systems shall stay off during unoccupied times unless either temperature or humidity levels reach pre-determined limits. At certain research facilities, a high supply air temperature shutdown sequence shall not be used. Only a high supply air temperature alarm is required.

2. Exhaust fans and outside air dampers shall be scheduled by the HVAC control system.

3. All Variable controlled systems (Pumping, Air Handling) shall utilize demand based control routines. Control sequence shall require reset of system set point by most demanding zone.

4. Refer to the "UF Control Systems Guide Specifications" standards document for guidelines and requirements of control system operational requirements. Refer to www.ppd.ufl.edu/pdf/ControlSystems-Guide.pdf for the requirements.

1.6 FACILITIES AUTOMATION CONTROL SYSTEMS (FACS)

A. GENERAL:

1. Refer to the "UF Control Systems Guide Specifications" standards document for guidelines and requirements of control system operational requirements. Refer to www.ppd.ufl.edu/pdf/ControlSystems-Guide.pdf for the requirements.

B. EQUIPMENT:

1. All FACS/DDC control panels shall be in a mechanical/electrical space with ample room for trouble-shooting, servicing, repairing and replacing.

2. The conditioned space housing FACS/DDC control panels must be maintain between 60F to 80F temperature range at all times.

3. FACS/DDC control panels are not permitted outside.

4. Any variance from above items #1 or #2 requires an approval from the appropriate Facilities or Project Manager.

END OF SECTION